

AMENDMENTS TO THE SPECIFICATION:

Please amend the title to read:

NEGATIVE ELECTRODE FOR NONAQUEOUS ELECTROLYTE SECONDARY BATTERY,
PROCESS OF PRODUCING THE NEGATIVE ELECTRODE, AND NONAQUEOUS
ELECTROLYTE SECONDARY BATTERY

Please amend the paragraph starting at page 1, line 7
as follows:

This invention relates to a negative electrode for
nonaqueous electrolyte secondary batteries. More particularly,
it relates to a negative electrode capable of intercalating and
deintercalating a large amount of lithium and providing a
nonaqueous electrolyte secondary battery with high energy density
and improved cycle life. The present invention also relates to a
nonaqueous electrolyte secondary battery using the negative
electrode.

Please amend the paragraph starting at page 4, line 14
as follows:

Accordingly, an object of the present invention is to
provide a negative electrode for a nonaqueous electrolyte
secondary battery that can solve the aforementioned various
problems and a nonaqueous electrolyte secondary battery having
the negative electrode.

Please amend the paragraph starting at page 4, line 19
as follows:

The present invention provides a negative electrode for a nonaqueous electrolyte secondary battery made up of an active material structure including an electro-conductive material having low capability of forming a lithium compound on at least one side of a current collector. The active material structure contains 5 to 80% by weight of active material particles containing a material having high capability of forming a lithium compound.

Please amend the paragraph starting at page 5, line 16
as follows:

The present invention also provides a nonaqueous electrolyte secondary battery having the negative electrode.

Please amend the paragraph starting at page 6, line 14
as follows:

The current collector 2 is made of a metal that can serve as a current collector of a nonaqueous electrolyte secondary battery. It is preferably made of a metal that can serve as a current collector of a lithium secondary battery. Such metals include copper, iron, cobalt, nickel, zinc, and silver, and their alloys. Particularly preferred ones among them are copper, a copper alloy, nickel or a nickel alloy. In using copper, the current collector has the form of copper foil.

Copper foil is obtained by, for example, electrodeposition using a copper-containing solution. A preferred copper foil thickness is 2 to 100 μm , still preferably 10 to 30 μm . The copper foil obtained by the method described in JP-A-2000-90937 is particularly preferred because of its extreme thinness with a thickness as small as 12 μm or less. Use of an electrolytic metal foil as a current collector 2 is advantageous in that the adhesion between the current collector 2 and the active material layer 3 is improved because of the moderate surface roughness of an electrolytic metal foil.

Please amend the paragraph starting at page 26, line 2 as follows:

The above-described metal foil, when used as a current collector of a nonaqueous electrolyte secondary battery, secures sufficient passageways therethrough for an electrolyte thereby bringing about a further increase in battery capacity. Moreover, the active material is more effectively prevented from falling off from the electrode as a result of intercalating and deintercalating lithium.

Please amend the paragraph starting at page 26, line 7 as follows:

The micropores of the metal foil preferably have a diameter of 0.01 to 200 μm , still preferably 0.05 to 50 μm ,

particularly preferably 0.1 to 10 μm . Micropores with a diameter less than 0.01 μm can fail to secure passage of a nonaqueous electrolyte sufficiently. Where the pore diameter exceeds 200 μm , the metal foil strength tends to reduce in relation to the foil thickness described below, the active material tends to fall off with intercalating and deintercalating of lithium, and the resulting nonaqueous electrolyte secondary battery tends to have reduced cycle characteristics. Not all the pores piercing the metal foil are required to have a diameter falling within the recited range. It is acceptable that the metal foil has a very small number of micropores with diameters out of that range that are unavoidably created in the course of metal foil manufacturing.

Please amend the paragraph starting at page 31, line 25 as follows:

After the formation of metal foil, the metal foil may be either separated from the support or left on the support as formed. For example, when the process is applied to the manufacture of a negative electrode for a nonaqueous electrolyte secondary battery, there is no need to separate the metal foil. In contrast, where the metal foil is to be separated, it is advisable to apply a release agent on the coating layer formed by applying the carbonaceous material-containing paste and then to electrodeposit the metal foil thereon so as to facilitate

peeling. The release agent that can be used includes those usable in the above-described process.

Please amend the paragraph starting at page 32, line 30 as follows:

The thus obtained negative electrode of the invention is assembled together with a known positive electrode, separator, and nonaqueous electrolyte into a nonaqueous electrolyte secondary battery. A positive electrode is obtained as follows. A positive electrode active material and, if necessary, a conductive material and a binder are suspended in an appropriate solvent to prepare a positive electrode active material mixture, which is applied to a current collector, dried, rolled, and pressed, followed by cutting and punching. The positive electrode active material includes conventionally known ones, such as lithium-nickel composite oxide, lithium-manganese composite oxide, and lithium-cobalt composite oxide. Preferred separators include a nonwoven fabric of synthetic resins and a porous film of polyethylene or polypropylene. The nonaqueous electrolyte used in a lithium secondary battery, for example, is a solution of a lithium salt, which is a supporting electrolyte, in an organic solvent. The lithium salt includes LiClO_4 , LiAlCl_4 , LiPF_6 , LiAsF_6 , LiSbF_6 , LiSCN , LiCl , LiBr , LiI , LiCF_3SO_3 , and $\text{LiC}_4\text{F}_9\text{SO}_3$.

Please amend the paragraph starting at page 36, line 16 as follows:

A nonaqueous electrolyte secondary battery was assembled using each of the negative electrodes prepared in Examples and Comparative Examples as follows. The battery was evaluated in irreversible capacity, capacity density per unit weight when charged, charge/discharge efficiency in the 10th cycle, and capacity retention in the 50th cycle in accordance with the following methods. The results of evaluation are shown in Table 1-1.

Please amend the heading at page 36, line 22 as follows:

1) Preparation of nonaqueous electrolyte secondary battery

Please amend the paragraph starting at page 36, line 23 as follows:

A metallic lithium as a counter electrode and the negative electrode obtained above as a working electrode were placed to face each other with a separator between them and assembled into a nonaqueous electrolyte secondary battery in a usual manner by using a LiPF₆ solution in a mixture of ethylene carbonate and diethyl carbonate (1:1 by volume) as a nonaqueous electrolyte.

Please amend the heading at page 42, line 17 as follows:

Performance evaluation:

Nonaqueous electrolyte secondary batteries were assembled using each of the negative electrodes prepared in Examples and Comparative Examples in the same manner as described supra. The battery was evaluated in irreversible capacity, capacity density per unit weight when charged, charge/discharge efficiency in the 10th cycle, and capacity retention in the 50th cycle in accordance with the methods described supra. The results of evaluation are shown in Tables 2-1 to 2-3.

Please amend the heading at page 51, line 24 as follows:

A nonaqueous electrolyte secondary battery was assembled using the negative electrodes prepared in Examples in the same manner as described supra. The battery was evaluated in irreversible capacity, capacity density per unit weight when charged, charge/discharge efficiency in the 10th cycle, and capacity retention in the 50th cycle in accordance with the methods described supra. The results of evaluation are shown in Tables 3-1 through 3-3.

Please replace the Abstract with the substitute Abstract appended to this paper.